Amendments to the Claims

This listing of claims will replace all prior versions, and listing, of claims in the application.

Listing of Claims:

1. (Original) A display device comprising:

an active matrix substrate;

a counter electrode;

a display medium layer interposed between the active matrix substrate and the counter electrode; and

a plurality of pixels,

wherein the active matrix substrate includes:

a base plate;

a plurality of pixel electrodes formed on the base plate, each said pixel electrode being associated with one of the plurality of pixels;

a plurality of pixel switching elements, each said pixel switching element being connected to associated one of the pixel electrodes;

a plurality of gate lines for controlling operations of the pixel switching elements;

a plurality of data lines, each said data line being connected to associated ones of the pixel electrodes by way of associated ones of the pixel switching elements so as to supply a data signal therethrough;

a plurality of data line switching elements, each said data line switching element having terminals, one of said terminals being connected to associated one of the data lines;

a plurality of signal input terminals, each said signal input terminal being connected to another terminal of associated one of the data line switching elements and another terminal of another associated one of the data line switching elements;

a data line branching section, which is provided between the signal input terminals and the data line switching elements; and

a control line, which is connected to the data line switching elements to selectively turn ON or OFF the data line switching elements,

wherein a signal to turn ON the data line switching elements and a signal to turn ON the pixel switching elements have mutually different polarities.

2. (Original) The display device of claim 1, wherein each said pixel switching element and each said data line switching element are thin-film transistors that have substantially the same channel length, and

wherein a ratio of a channel width of each said pixel switching element to an electrostatic capacitance of associated one of the pixels is substantially equal to a ratio of a channel width of each said data line switching element to an electrostatic capacitance of associated one of the data lines.

3. (Original) The display device of claim 1, wherein each said pixel switching element and each said data line switching element are thin-film transistors, and

wherein the thin-film transistors have channels extending in parallel with each other.

4. (Original) The display device of claim 1, wherein each said pixel switching element is an n-channel transistor or a p-channel transistor, and

wherein if the pixel switching element is an n-channel transistor, each said data line switching element is a p-channel transistor, and

wherein if the pixel switching element is a p-channel transistor, the data line switching element is an n-channel transistor..

5. (Original) The display device of claim 4, wherein the pixel switching element is an n-channel transistor and the data line switching element is a p-channel transistor.

6. (Original) The display device of claim 1, wherein each said pixel switching element is an n-channel transistor or a p-channel transistor, while each said data line switching element includes an n-channel transistor and a p-channel transistor that are connected in parallel with each other, and

wherein in the data line switching element, one of the p-and n-channel transistors that has a polarity different from that of the pixel switching element has a *channel* length or channel width greater than that of the other transistor.

7. (Original) The display device of claim 1, wherein each said pixel switching element and each said data line switching element both have a semiconductor layer, which has been deposited on the base plate, as a transistor active region.

8. (Original) The display device of claim 1, wherein the display medium layer is a liquid crystal layer.

9. (Canceled)

10. (Original) An active matrix substrate comprising:

a base plate;

a plurality of pixel electrodes formed on the base plate;

a plurality of pixel switching elements, each said pixel switching element being connected to associated one of the pixel electrodes;

a plurality of gate lines for controlling operations of the pixel switching elements;

a plurality of data lines, each said data line being connected to associated ones of the pixel electrodes by way of associated ones of the pixel switching elements so as to supply a data signal therethrough;

a plurality of data line switching elements, each said data line switching element having terminals, one of said terminals being connected to associated one of the data lines;

a plurality of signal input terminals, each said signal input terminal being connected to another terminal of associated one of the data line switching elements and another terminal of another associated one of the data line switching elements;

a data line branching section, which is provided between the signal input terminals and the data line switching elements; and

a control line, which is connected to the data line switching elements to selectively turn ON or OFF the data line switching elements,

wherein a signal to turn ON the data line switching elements and a signal to turn ON the pixel switching elements have mutually different polarities.

11. (Original) A display device comprising a display region unit, wherein the display region unit includes:

a substrate on which a plurality of pixels are arranged in columns and rows;

a driver for driving the pixels; and

switching means, formed on the substrate, for changing an electrical connection state between the pixels and the driver, and

wherein the switching means includes:

a first switching element located closer to one of the pixels; and

a second switching element located closer to the driver, and

wherein a signal to turn ON the first switching element and a signal to turn ON the second switching element have mutually different polarities.

12. (Original) A method for driving a display device, the display device comprising:

an active matrix substrate;

a counter substrate, which is disposed so as to face the active matrix substrate and includes a counter electrode; and

a display medium layer interposed between the active matrix and counter substrates,

wherein the active matrix substrate includes:

a base plate;

a plurality of pixel electrodes formed on the base plate;

a plurality of pixel switching elements, each said pixel switching element being connected to associated one of the pixel electrodes;

a plurality of gate lines for controlling operations of the pixel switching elements;

a plurality of data lines, each said data line being connected to associated ones of the pixel electrodes by way of associated ones of the pixel switching elements so as to supply a data signal therethrough;

a plurality of data line switching elements, each said data line switching element having terminals, one of said terminals being connected to associated one of the data lines;

a plurality of signal input terminals, each said signal input terminal being connected to another terminal of associated one of the data line switching elements and another terminal of another associated one of the data line switching elements;

a data line branching section, which is provided between the signal input terminals and the data line switching elements; and

a control line, which is connected to the data line switching elements to selectively turn ON or OFF the data line switching elements,

wherein a signal to turn ON the data line switching elements and a signal to turn ON the pixel switching elements have mutually different polarities, and

wherein the method drives the display device in such a manner that an interval, in which one of the pixel switching elements is turned OFF to hold a potential level of associated one of the data lines as applied to associated one of the pixel electrodes, overlaps at least partially with

an interval, in which one of the data line switching elements that is associated with the data line is turned OFF to hold a potential level of the data signal on the data line, for the pixel electrode and the counter electrode that face each other via the display medium layer.

13. (Original) A display device comprising:

a pair of substrates that is disposed so as to face each other and be spaced apart from each other;

a display medium layer interposed between the pair of substrates; and

a plurality of pixels,

wherein a plurality of counter signal electrodes, each of which extends in a column direction and through which a data signal is supplied, are formed on one of the pair of substrates, and

wherein the other of the pair of substrate includes:

a plurality of pixel electrodes arranged in matrix, each said pixel electrode being associated with one of the plurality of pixels;

a plurality of pixel switching elements, each of which is connected to associated one of the pixel electrodes;

a plurality of gate lines, which extend in a row direction and are used for controlling operations of the pixel switching elements; and

a plurality of common lines, each of which is connected to associated ones of the pixel electrodes by way of associated ones of the pixel switching elements, and

wherein the display device further includes a plurality of signal electrode switching elements, each of which is connected to associated one of the counter signal electrodes and controls supply of the data signal to the counter signal electrode, and

wherein a signal to turn ON the signal electrode switching elements and a signal to turn ON the pixel switching elements have the same polarity.

14. (Original) The display device of claim 13, wherein the signal electrode switching elements and the pixel switching elements are formed on the same substrate, and

wherein the display device further comprises a plurality of signal electrode transfer sections, each of which is used to ensure electrical connection between each of the signal electrode switching elements and associated one of the counter signal electrodes.

15. (Original) The display device claim 13, wherein each said pixel switching element and each said signal electrode switching element are thin-film transistors that have substantially the same channel length, and

wherein a ratio of a channel width of each said pixel switching element to an electrostatic capacitance of associated one of the pixels is substantially equal to a ratio of a channel width of each said signal electrode switching element to an electrostatic capacitance of associated one of the counter signal electrodes.

16. (Original) The display device of claim 13, wherein each said pixel switching element and each said signal electrode switching element are thin-film transistors, and

wherein channels of the thin-film transistors extend substantially in parallel with each other.

17. (Original) The display device of claim 13, wherein each said pixel switching element and each said signal electrode switching element are both n-channel transistors.

18. (Original) The display device of claim 13, wherein each said pixel switching element and each said signal electrode switching element are both p-channel transistors.

19. (Original) The display device of claim 13, wherein the display medium layer is a liquid crystal layer.

20. (Original) A method for driving a display device, the display device including:

a pair of substrates that is disposed so as to face each other and be spaced apart from each other; and

a display medium layer interposed between the pair of substrates,

wherein a plurality of counter signal electrodes, each of which extends in a column direction and through which a data signal is supplied, are formed on one of the pair of substrates, and

wherein the other of the pair of substrates includes:

a plurality of pixel electrodes arranged in matrix;

a plurality of pixel switching elements, each of which is connected to associated one of the pixel electrodes;

a plurality of gate lines, which extend in a row direction and are used for controlling operations of the pixel switching elements; and

a plurality of common lines, each of which is connected to associated ones of the pixel electrodes by way of associated ones of the pixel switching elements, and

wherein the display device further includes a plurality of signal electrode switching elements, each of which is connected to associated one of the counter signal electrodes and controls supply of the data signal to the counter signal electrode, and

wherein the method drives the display device in such a manner that an interval, in which one of the pixel switching elements is turned OFF to hold a potential level on associated one of the common lines as applied to associated one of the pixel electrodes, overlaps at least partially with an interval, in which one of the signal electrode switching elements is turned OFF to hold a potential level of the data signal as applied to associated one of the counter signal electrodes, for the pixel electrode and the counter signal electrode that face each other via the display medium layer.

21. (Original) A display device comprising:

a pair of substrates that is disposed so as to face each other and be spaced apart from each other; and

a display medium layer interposed between the pair of substrates,

wherein a plurality of counter signal electrodes, each of which extends in a column direction and through which a data signal is supplied, are formed on one of the pair of substrates, and

wherein the other substrate of pair of includes:

a plurality of pixel electrodes arranged in matrix;

a plurality of pixel switching elements, each of which is connected to associated one of the pixel electrodes;

a plurality of gate lines, which extend in a row direction and are used for controlling operations of the pixel switching elements; and

a plurality of common lines, each of which is connected to associated ones of the pixel electrodes by way of associated ones of the pixel switching elements, and

wherein the display device further includes a plurality of signal electrode switching elements, each of which is connected to associated one of the counter signal electrodes and controls supply of the data signal to the counter signal electrode.

22. (New) The display device of claim 1, wherein a potential drop (or rise) associated with the data line switching elements being turned from ON to OFF is almost equal to a potential drop (or rise) associated with the pixel switching elements being turned from ON to OFF.

23. (New) The display device of claim 1, wherein a potential drop (or rise) associated with the data line switching elements being turned from ON to OFF and a potential drop (or rise) associated with the pixel switching elements being turned from ON to OFF is such as to minimize a variation in voltage being applied to the display medium.

24. (New) The display device of claim 1, wherein voltages supplied to the data lines and the signal lines have mutually different polarity.

25. (New) The display device of claim 1, further comprising:

a power supply having a voltage range for supplying voltages to the data lines;

a power supply having a voltage range for supplying voltages to the counter electrode; and

wherein one of (1) the voltage range of the power supply for supplying voltages to the data lines is within the voltage range of the power supply for supplying voltages to the counter electrode or (2) the voltage range of the power supply for supplying voltages to the counter electrode is within the voltage range of the power supply for supplying voltages to the data lines.

26. (New) The display device of claim 1, wherein a potential drop (or rise) associated with the data line switching elements being turned from ON to OFF and a potential drop (or rise) associated with the pixel switching elements being turned from ON to OFF is such that unfavorable direct current components are further reduced and so that a voltage at a level closer to a desired voltage is applied to the display medium.

27. (New) The active matrix substrate of claim 10, wherein a potential drop (or rise) associated with the data line switching elements being turned from ON to OFF is almost equal to a potential drop (or rise) associated with the pixel switching elements being turned from ON to OFF.

28. (New) The active matrix substrate of claim 10, wherein voltages supplied to the data lines and the signal lines have mutually different polarity.

29. (New) The active matrix substrate of claim 10, further comprising:

a power supply having a voltage range for supplying voltages to the data lines;

a power supply having a voltage range for supplying voltages to the counter electrode; and

wherein one of (1) the voltage range of the power supply for supplying voltages to the data lines is within the voltage range of the power supply for supplying voltages to the counter electrode or (2) the voltage range of the power supply for supplying voltages to the counter electrode is within the voltage range of the power supply for supplying voltages to the data lines.

30. (New) The display device of claim 11, wherein a potential drop (or rise) associated with the first line switching element being turned from ON to OFF is almost equal to a potential drop (or rise) associated with the second switching element being turned from ON to OFF.

31. (New) The display device of claim 11, wherein a potential drop (or rise) associated with the first switching element being turned from ON to OFF and a potential drop (or rise) associated with the second switching element being turned from ON to OFF is such as to minimize a variation in voltage being applied to a display medium.

32. (New) The display device of claim 11, wherein a potential drop (or rise) associated with the first switching element being turned from ON to OFF and a potential drop (or rise) associated with the second switching element being turned from ON to OFF is such that unfavorable direct current components are further reduced and so that a voltage at a level closer to a desired voltage is applied to a display medium.

33. (New) The display device of claim 11, wherein voltages supplied to the data lines and the signal lines have mutually different polarity.

34. (New) The display device of claim 11, further comprising:

a power supply having a voltage range for supplying voltages to the data lines;

a power supply having a voltage range for supplying voltages to the counter electrode;

and

wherein one of (1) the voltage range of the power supply for supplying voltages to the data lines is within the voltage range of the power supply for supplying voltages to the counter electrode or (2) the voltage range of the power supply for supplying voltages to the counter electrode is within the voltage range of the power supply for supplying voltages to the data lines.

35. (New) The display driving method of claim 12, wherein a potential drop (or rise) associated with the data line switching elements being turned from ON to OFF is almost equal to a potential drop (or rise) associated with the pixel switching elements being turned from ON to OFF.

36. (New) The display driving method of claim 12, wherein a potential drop (or rise) associated with the data line switching elements being turned from ON to OFF and a potential drop (or rise) associated with the pixel switching elements being turned from ON to OFF is such as to minimize a variation in voltage being applied to the display medium.

37. (New) The display driving method of claim 12, wherein a potential drop (or rise) associated with the data line switching elements being turned from ON to OFF and a potential drop (or rise) associated with the pixel switching elements being turned from ON to OFF is such that unfavorable direct current components are further reduced and so that a voltage at a level closer to a desired voltage is applied to the display medium.

38. (New) The display driving method of claim 12, wherein voltages supplied to the data lines and the signal lines have mutually different polarity.

39. (New) The display driving method of claim 12, wherein the display device further comprises:

a power supply having a voltage range for supplying voltages to the data lines;

a power supply having a voltage range for supplying voltages to the counter electrode; and

wherein one of (1) the voltage range of the power supply for supplying voltages to the data lines is within the voltage range of the power supply for supplying voltages to the counter electrode or (2) the voltage range of the power supply for supplying voltages to the counter electrode is within the voltage range of the power supply for supplying voltages to the data lines.